CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

36241

Project Title

Effects on Mouse Growth of Postnatal Novel Protein Kinase Gene Deletion in Endothelial Cells

Abstract

Objectives/Goals

The objective of this study was to determine if induced postnatal deletion of a protein kinase in vascular endothelial cells will result in mice experiencing changes in growth as evidenced by body weight.

Methods/Materials

The protein kinase floxed mice were genotyped by first performing a DNA extraction on mice ear clippings. The mouse genomic DNA was then amplified through the process of PCR. Afterwards, an agarose gel electrophoresis was run in order to separate the DNA according to fragment size. The gel was then visualized and photographed in a BioRad imaging unit to detect the size of the PCR reaction products. These protein kinase fl/fl mice were crossed with Cdh5Cre +/+ mice to produce pups with protein kinase and Cre alleles. Those pups and wild-type littermates were injected with tamoxifen at birth in order to induce deletion of the endothelial protein kinase. The induced animals were weighed over time to monitor overall growth. After termination, body weight versus genotype was evaluated to see if the protein kinase deletion slowed growth, and a statistical analysis of body weight over time was performed.

Results

Analysis of animal weights over time shows that both the induced homozygous null and heterozygous protein kinase floxed/Cre+ mice that had a mean body weight at 12 months 23 + 2.2 % greater than wild type littermates; a significant difference ($p < 0.01$). Induced-deletion of protein kinase brains were 10 + 1.8% larger than wild-type. Both the heterozygous and homozygous null mice had significantly increased total body weight and brain weight as compared to wild-type.

Conclusions/Discussion

Genotyping indicated that Cre-mediated endothelial deletion of the protein kinase produced related significant changes in mouse body size. These data suggest that the increased body weight is directly related to blood vessel growth. Since heterozygous and homozygous deletion equaled in resulting weight increase, biallelic deletion is not necessary for interfering with the protein kinase's normal function. This is evidence that the protein kinase normally restrains endothelial cell proliferation. Excessive cellular proliferation is a common feature of many cancers. The protein kinase disruption has the potential to be involved in some cancers, and knowing its function presents a possible therapeutic target for cancer patients.

Summary Statement

I determined that a protein kinase normally restrains endothelial cell proliferation, and that growth of blood vessels appears to influence overall body size.

Help Received

I performed all experiments including the DNA extraction and PCR genotyping, as well as analyzed and graphed the results myself. Dr. Rebecca Stockton provided me with mouse ear clippings, use of her facilities and resources, and her guidance. Taline Shishonian also provided guidance and supervision.